



## PREVALENCE OF OBESITY AND ITS COMORBIDITIES IN A TERTIARY CARE HOSPITAL

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Article Received on 12/03/2020

Article Revised on 31/03/2020

Article Accepted on 21/04/2020

### ABSTRACT

Obesity, a metabolic disorder characterised with a build-up of fat in the body which deteriorates our health and is one of the major risk factors for most of the long term disease related to the cardiovascular system of the body. Obesity assessment can be made using the Body Mass Index Scales and relate the grade of obesity with various cardiometabolic diseases. The study aims to understand the relationship and prevalence of cardiometabolic diseases with the various grades of obesity. The study revealed that males are more prone to obesity 57.7% rather than females. It was also found that patients with underweight, normal, overweight, grade I obese, grade II obese and grade III obese was 5.19%, 44.1%, 25.97% 18.83%, 4.54% and 1.29% respectively of the total study population. It was concluded that one of the most modifiable risk factors of cardiometabolic disorders is obesity, and reduction of the excess body fat or maintaining a normal body mass index helps in delaying the progression of the chronic cardiometabolic disorders.

**KEYWORD:** Obesity, Body Mass Index, Cardiovascular diseases, Metabolic diseases.

### INTRODUCTION

Obesity is a chronic metabolic disorder that is defined as an abnormal and extreme build-up of fat in the body that may impair health and is determined by genetic predisposition, a sedentary lifestyle, and multiple biological and environmental factors. This may be secondary to overconsumption of energy-rich foods, high-fat and unhealthy snacking between meals.<sup>[1]</sup>

The major allegory in healthcare is that obesity is a self-induced problem treated by eating less amount of food and getting additional exercise. Although years of treating obesity with out-dated methods of dieting and exercise, improvement has not been made as these traditional ways to lose weight are less effective.<sup>[2]</sup> India, recognized for its malnourished population, now has more and more overweight and obese people having a high risk of adverse consequences. Obesity in India is altered from the rest of the world; the “Thin-Fat Indian Phenotype”<sup>[3]</sup> in that the amount of body fat, subcutaneous fat, abdominal obesity, intra-abdominal fat is more in Indian overweight and obese population.<sup>[4]</sup> Obesity is a major risk factor for cardiometabolic diseases including hypertension, type 2 diabetes mellitus, and cardiovascular disease by increasing inflammation, which might increase mortality.<sup>[5,6]</sup> Childhood obesity results in the same conditions, with premature onset, or

with greater likelihood in adulthood. Thus, the economic and psychosocial costs of obesity alone, as well as when coupled with these comorbidities and risk factors are striking.<sup>[7]</sup>



**Fig 1: Comorbidities associated with Obesity.**

Current studies have expressed that globally, more than 1.9 billion adults are overweight and 650 million are obese. In India, more than 135 million persons were suffering from obesity. The prevalence of obesity in India varies owed to socio-economic status, gender, age, geographical environment etc.<sup>[8]</sup>

**Assessment of Obesity**

**a) Body Mass Index (BMI)**

BMI, representing an index of an individual’s fatness is currently in use for screening Obesity and overweight. It also is widely used as a risk factor for the development of or the prevalence of several conditions. The World Health Organization (WHO) classification of bodyweight for height, based on the BMI, was published and adopted. Four categories were established: underweight, normal, overweight, and obese.<sup>[9]</sup> BMI is calculated as weight (in Kg) divided by height (in meters) squared as given in the

table below. Precision of BMI breaks down at the extremes of height and muscularity. Body builders because of their extra muscle weight will have a high BMI. In the meantime, a person with an exceptionally thin frame but excess truncal fat might have a normal BMI.<sup>[10]</sup> It is a reasonable and convenient measure that applies well to large populations and can supplement other information about individual patients.<sup>[10]</sup> BMI (Metric Formula) =Weight in Kilograms/Height in meters<sup>2</sup>

| Body weight category | Body Mass Index | Obesity Class | Disease risk (relative to normal weight and waist circumference) |                             |
|----------------------|-----------------|---------------|--|-----------------------------|
|                      |                 |               | Men < 102 cm<br>Women < 88 cm                                    | Men >102 cm<br>Women >88 cm |
| Underweight          | <18.5           |               |  |                             |
| Normal               | 18.5–24.9       |               |  |                             |
| Over weight          | 25.0–29.9       |               | Increased  | High                        |
| Obesity              | 30.0–34.9       | I             | High   | Very High                   |
|                      | 35.0–39.9       | II            | Very High  | Very high                   |
| Extreme obesity      | >40.0           | III           | Extremely High   | Extremely High              |

**Fig 2: Classification of Overweight and Obesity by BMI, Waist Circumference, and Associated Disease Risks.**

- b) A full medical assessment is needed for obese persons including routine evaluation of comorbidities such as hypertension, diabetes and hyperlipidaemia. A cardiovascular examination is needed for persons older than 40 years or having a history of cardiovascular disease.<sup>[11]</sup>
- c) a) Several laboratory tests may be performed to assess comorbid conditions associated with obesity - Fasting lipid profile, Liver function tests, Thyroid function tests, fasting glucose and hemoglobin A1c(HBA1c), etc.<sup>[11]</sup>

Treatment depends on the cause and severity of the condition and its complications which include lifestyle changes, such as heart-healthy eating, increased physical activity, healthy sleep and Food and Drug Administration (FDA)-approved weight-loss medicines. For some individuals, surgery may be a treatment option.<sup>[11]</sup>

Hence, the main aim of the present work is to carry out a prospective observational study, to outline the prevalence and trends of obesity, to evaluate the various risk factors that contribute to the development of obesity and overweight and to examine the relation of obesity with selected morbidities.

**AIMS AND OBJECTIVES**

**Aims**

To study the disease prevalence in various BMI classes.

**OBJECTIVES**

- To study the population distribution in various BMI

- grades.
- To study the disease distribution in various BMI classes.

**METHODS**

The retrospective study was conducted in a tertiary care hospital in Hyderabad, India. The study was conducted in the inpatients whose height and weight were measured and the total population was 154 patients in a period of 1 year. The data was collected from the inpatient case sheets and progress charts for their demographics details, disease conditions and relevant laboratory data to confirm the diagnosis of the patients.

The inclusion criteria included non-emergency patients whose height and weight were measured and the patients whose height and weight could not be measured due to inability from the disease were excluded from the study. The pregnant population was also excluded from the study.

BMI of the patients was calculated from the data collected using the BMI formula and the data was handled using MS Excel 2016. The results were obtained in the form of percentages, counts, graphs and pie charts and the relationship of the obesity classes with various comorbidities was estimated.

**RESULTS**

The study included a total of 154 patients out of which 65 (42.2%) were female patients and 89(57.7%) were male.

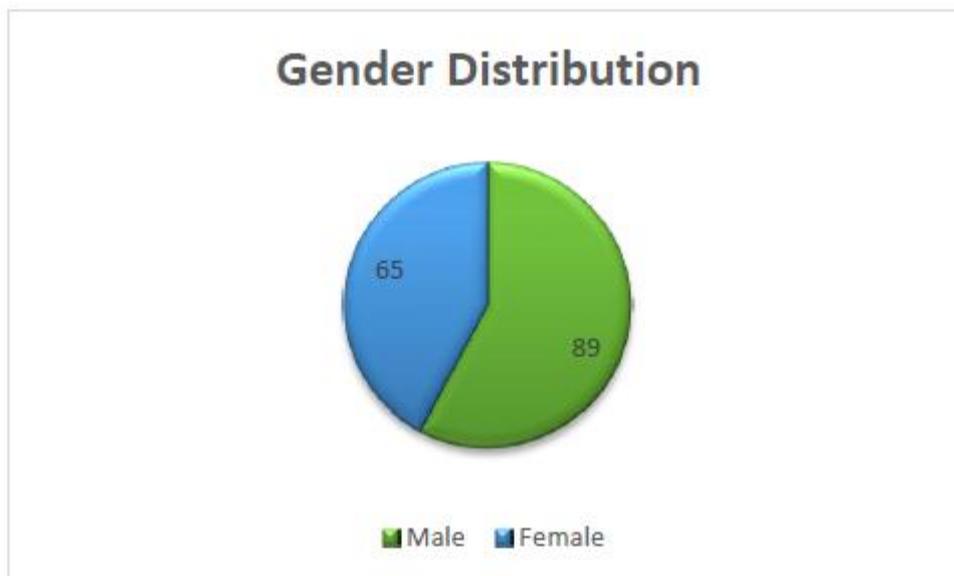


Fig. 3: Gender distribution of the Population.

The range of the age of the population was in between (17-84) years of age. The mean age of the population included in the study was 51.13years. Of the 154 patients

the patients that were found to be underweight were 8(5.19%). The patients that had normal BMI were found.

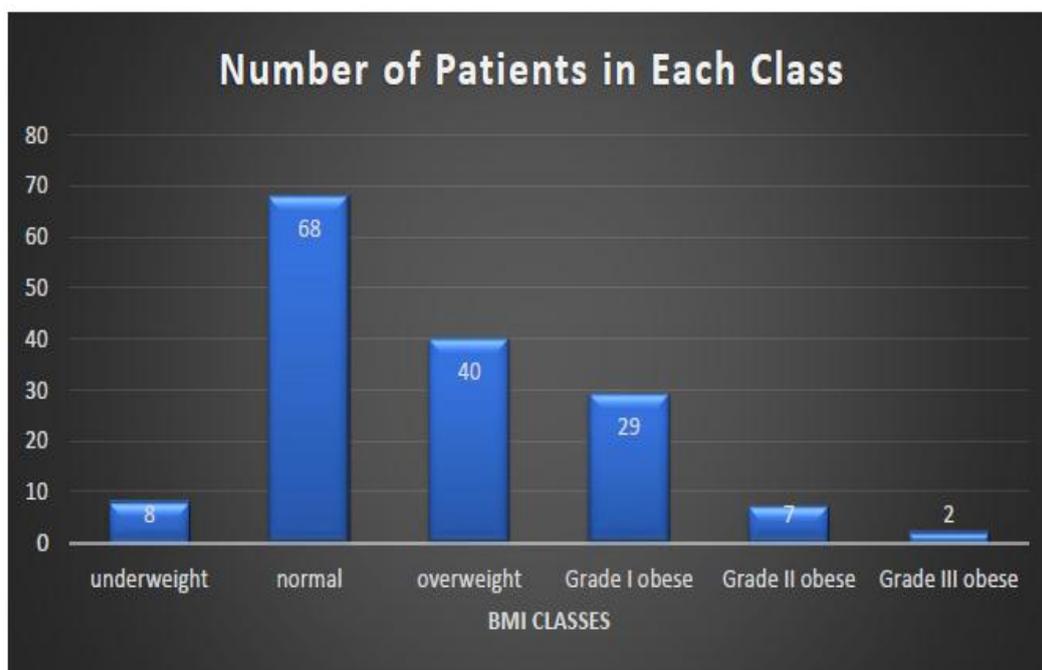


Fig. 4: Population Distribution into various BMI Classes.

to be 68(44.1%). patients that were found to be pre-obese were 40 (25.97%). Patients with Grade I obesity were 29 (18.83%). Patients with Grade II obesity were 7 (4.54%). Patients with Grade III obesity were found to have 2 (1.29%).

**PREVALENCE OF COMPLICATIONS WITH RESPECT TO BMI**

Out of the total population of 154 patients. The population that was found to be underweight 8(5.19%) among them 7 of them had no complications and 1 patient

had Diabetes mellitus 2 and Hypertensive.

Population with normal BMI found to be 68(44.1%) among them 24 (35.29%) had no complications 20 (29.41%) were found to be Type 2 Diabetic 26 (38.2%) were found to be hypertensive. 26(38.2%) were found to have cardiovascular diseases 1 (1.47%) and 5 (7.35%) were found to have hypothyroid.

Population that were found to be overweight 40(25.97%) among them 8(20%) had no complications, 16 (40%)

found to have Type II Diabetes mellitus 22 (55%) had hypertension, 10 (25%) had cardiovascular disease and 2 (5%) had hypothyroidism.

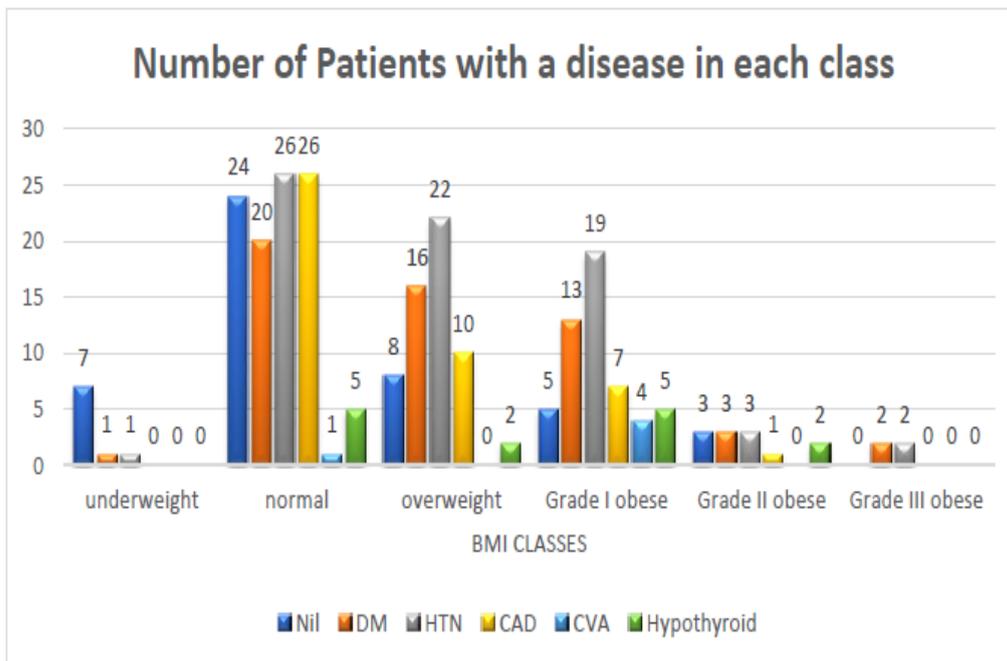


Fig. 5: Prevalence of comorbidities in relation to different class of obesity.

The population that was found to have Grade I Obese 29(18.83%) among them 5 (17.24%) had no complications, 13(44.8%) had Type II Diabetes Mellitus, 19(47.5%) were found to have hypertension, 7(17.5%) had cardiovascular disease, 4(13.7%) had cerebrovascular disease and 5 (17.24%) were found to have hypothyroid.

The population that was found to have Grade II obese were 7 (4.54%), patients that had no complications were 3(42.8%), 3(42.8%) were found to have Type II diabetes Mellitus, 3(42.8%) were found to be hypertensive, 1(14.2) were found to have cardiovascular disease and 2 (28.5%) were found to have hypothyroidism.

The population that was found to have Grade III obese was 2(1.29%), patients that had no complications were 0,2 patients were found to have diabetes,1 patient was found to have hypertension.

**DISCUSSION**

The study that was carried out showed that almost 44% of the total population had BMI in the normal range that is more than half of them. The percentage of patients with preobese was 25.9% that is more than one-fourth of the population.

Data from the national health examination survey that was conducted in USA<sup>[12]</sup>, showed the prevalence of obesity was higher in females contradictory to it we found a higher percentage of the male population in our study, however, the study was conducted on objective of BMI data and sex bias was not a factor.

Obesity increases the risk of type – II DM, HTN and cardiovascular risk factors.<sup>[13,14]</sup> In the current study 35.7% of the entire population had a diagnosis of type – II DM that was found to be more when compared to a study that showed a prevalence of 12-14% in the US population.<sup>[15]</sup> Patients with obesity and type – II DM have shown an increased incidence of cardiovascular disease and hypertension.<sup>[16,17]</sup> The increased absence of recognition of obesity as a modifiable risk factor for a disease with underdiagnosis has shown improved cardiovascular risk factors.<sup>[18]</sup>

**CONCLUSION**

The results of the study report the prevalence of various obesity classes and the associated comorbidities in a tertiary care hospital in India. One half of the study population belonged to either overweight or obese category and were at higher risk of cardiovascular and metabolic disorders. There were many barriers such as underdiagnosis and failure to consider obesity as a disease, for the treatment of obesity and a wide area of research is available in the diagnosis and treatment of obesity.

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